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Remarks:
This application was filed on 03.08.2020 as a divisional application to the application mentioned under INID code 62.

(54) A HEADSET WITH FORCE ISOLATION

(57) A method and system is disclosed for a headset with force isolation, where the headset comprises a headband having two upper headband sections coupled by a center block and two ear cups, where each ear cup is coupled to one of the two upper headband sections. The two upper headband sections may include side support strips between which a movable strip may be placed utilizing a slider knob, thereby increasing the rigidness of the headband when fully extended between the side support strips utilizing the slider knob. The rigidness of the headband may decrease when the movable strips are retracted from between the side support strips and into the center block utilizing the slider knob. The side support strips may be plastic and the movable strip may be metal. The center block may be more rigid than the side support strips. The center block may be plastic. The headband may include headband endcaps at lower ends of the headband.

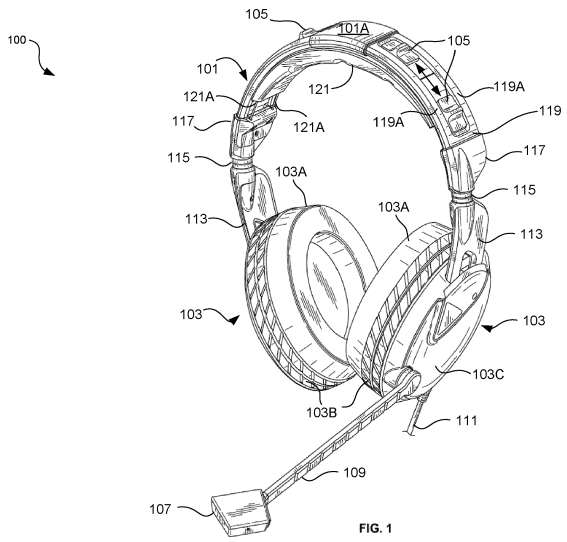

FIG. 1

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Description

TECHNICAL FIELD

[0001] Aspects of the present application relate to audio headsets, and more specifically, to methods and systems for a headset with force isolation.

BACKGROUND

[0002] Limitations and disadvantages of conventional approaches to adjustable headsets will become apparent to one of skill in the art, through comparison of such approaches with some aspects of the present method and system set forth in the remainder of this disclosure with reference to the drawings.

[0003] WO 89/10107 A1 shows an audio headset system according to the preamble of claim 1. It describes a headphone having a head stirrup with two sprung attachment arms coupled to earpieces. Next to each sprung attachment arm four elongated sprung legs and a slider knob are provided. The elongated sprung legs are oriented under an angle with respect to a horizontal line. This angle is increased in an area, where the slider knob is located. An decreased angle leads to a decreased rigidity of the sprung legs. The rigidity may be controlled by the position of the slider knob.

[0004] US 2008/0037817 A1 shows a neckband type headset, which includes a headset band and a pair of earpieces. In the middle of the headset band a stress concentration portion is provided comprising an adjustment pin. Upon movement of the adjustment pin the pressure of the earpieces put on the users' ears is adjustable.

[0005] US 2014/0263493 A1 shows a headband with a primary spring and a secondary spring located adjacent the primary spring. The stiffness of the headband is adjustable by movement of two clamps along the primary and the secondary spring.

[0006] US 2014/023222 A1 describes a headphone including a headband having flexibility; a slider having flexibility with the headband attached at one end, and a headphone unit attached at the other end; a slide groove, arranged at an end of the headband or the one end of the slider, for guiding a circling movement of the slider with respect to the headband; and a slider guide, having rigidity higher than the headband and the slider, for holding the one end of the slider at the end of the headband so that one surface of the slider facing one surface of the headband circling moves with respect to the one surface of the headband while being engaged to the slide groove. A headphone that can be thinned while suppressing lowering of the attachment property is provided.

[0007] It is an object of the present invention to provide an audio headset system and an audio headset with improved adjustability of the rigidity of its headband.

BRIEF SUMMARY

[0008] This problem is solved by an audio headset system according to claim 1 and by an audio headset according to claim 9. Preferred embodiments are mentioned in the dependent claims.

[0009] Methods and systems are described below for a headset with force isolation, substantially as illustrated by and/or described in connection with at least one of the figures, and as set forth more completely in the claims.

[0010] An audio headset, the headset preferably comprises: a headband having two upper headband sections coupled by a center block; and two ear cups, each coupled to one of the two upper headband sections, wherein each of the two upper headband sections comprise side support strips between which a movable strip is operably placed utilizing a slider knob.

[0011] The movable strips preferably provide increased rigidness for the headband when fully extended between the side support strips utilizing the slider knob.

[0012] The rigidness of the headband preferably decreases when the movable strips are retracted from between the side support strips and into the center block utilizing the slider knob.

[0013] The side support strips preferably comprise plastic or metal.

[0014] The center block is preferably more rigid than the side support strips and may comprise plastic.

[0015] The headband preferably comprises headband endcaps at lower ends of the headband.

[0016] The slider knobs are preferably operably configured at positions between the center block and the headband endcaps. The ear cups are preferably coupled to the upper headband sections via headband slides that are coupled to the headband end caps.

[0017] A method for adjusting a headset, the method preferably comprising: in a headset having two upper headband sections coupled by a center block and having two ear cups, each ear cup being coupled to one of the two upper headband sections, and wherein each of the two upper headband sections comprise side support strips: operably placing a movable strip between the side support strips in the upper headband sections.

[0018] The ear cups are preferably coupled to the upper headband sections via headband slides that are coupled to the headband end caps and the slider knobs are operably configured at positions between the center block and the headband endcaps.

[0019] An audio headset, the headset preferably comprising: a headband having two upper headband sections coupled by a center block; and two ear cups, each coupled to one of the two upper headband sections, wherein each of the two upper headband sections comprise flexible side support strips between which a movable rigid strip is operably placed utilizing a slider knob.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

FIG. 1 depicts an oblique view of an example headset, in accordance with an embodiment of the disclosure.

FIG. 2 illustrates a front view of a headset with force isolation, in accordance with an example embodiment of the disclosure.

FIG. 3 is a top view of a headset with force isolation, in accordance with an example embodiment of the disclosure.

FIG. 4 illustrates an oblique view of a headband slide for force isolation, in accordance with an example embodiment of the disclosure.

FIG. 5 illustrates a partial exploded view of the headband with force isolation, in accordance with an example embodiment of the disclosure.

FIG. 6 illustrates a bottom view of the headband, in accordance with an example embodiment of the disclosure.

FIG. 7 is a flowchart illustrating an example process for a headset with force isolation.

DETAILED DESCRIPTION

[0021] Certain aspects of the disclosure may be found in a headset with force isolation. Example aspects of the disclosure may include a headset comprising a headband having two upper headband sections coupled by a center block and two ear cups, where each ear cup is coupled to one of the two upper headband sections. Each of the two upper headband sections may comprise side support strips between which a movable strip may be operably placed utilizing a slider knob. The movable strips may provide increased rigidness for the headband when they are fully extended between the side support strips utilizing the slider knob. The rigidness of the headband may decrease when the movable strips are retracted from between the side support strips and into the center block utilizing the slider knob. The side support strips may comprise plastic and the movable strip may comprise metal. The center block may be more rigid than the side support strips. The center block may comprise plastic. The headband may comprise headband endcaps at lower ends of the headband. The slider knobs may be operably configured at positions between the center block and the headband endcaps. The ear cups may be coupled to the upper headband sections via headband slides that are coupled to the headband end caps.

[0022] As utilized herein, "and/or" means any one or more of the items in the list joined by "and/or". As an example, "x and/or y" means any element of the three-element set {(x), (y), (x, y)}. In other words, "x and/or y" means "one or both of x and y". As another example, "x, y, and/or z" means any element of the seven-element set {(x), (y), (z), (x, y), (x, z), (y, z), (x, y, z)}. In other words, "x, y and/or z" means "one or more of x, y and z". As utilized herein, the term "exemplary" means serving as a non-limiting example, instance, or illustration. As utilized herein, the terms "e.g.," and "for example" set off lists of one or more non-limiting examples, instances, or illustrations.

[0023] FIG. 1 depicts an oblique view of an example headset, in accordance with an embodiment of the disclosure. Referring to FIG. 1, there is shown a headset 100 with headband 101 and ear cups 103. There are also shown a microphone 107, a microphone boom arm 109, a line-in cable 111, headband slides 113, headband pivots 115, headband endcaps 117, an upper headband 119, and a floating headband 121. The headset 100 may be utilized for gaming, phone, or audio playback purposes, for example. In an example scenario, the headset 100 comprises a powered headset. In another example scenario, the headset 100 comprises a passive headset.

[0024] The headband pivots 115 couple the headband slides 113 to the headband endcaps 117, and provide rotational control for the ear cups 103. The microphone 107 provides electrical signals proportional to sound waves detected and may comprise a directional microphone for picking up audio signals from the user while sensing reduced background noise or sound from other sources, for example. The boom arm 109 provides a rigid support for the microphone 107, enabling an optimal position in front of the user for sensing sound from the user.

[0025] The ear cups 103 may be coupled to the headband 101 via headband slides 113 and to headband endcaps 117 via headband pivots 115. The headband slides may comprise metal or rigid plastic and may comprise a fork structure, where the two tines extend into the ear cups 103 and may have hemispherical ball features thereon that may be slid into detent features in the ear cup 103, thereby providing discrete headset size settings that are held in place utilizing a ball detent structure. This vertical adjustment of the headband slides 113 may comprise a major adjustment of the headset 100. The major adjustment changes the size of the headset 100 as well as the force on the ear.

[0026] Minor adjustment of the headset 100 is enabled by the floating headband 121, which may comprise a flexible band with wire segments 121A that extend from the headband endcaps 117 into the floating headband 121 and back down to the headband endcaps 117. The flexibility in the floating headband 121 therefore provides a minor adjustment of the headset 100.

[0027] The ear cups 103 may each comprise an ear pad 103A, a gimbal gasket 103B, and an outer shell 103C. The ear pads 103A may comprise pads that provide cushion for the user's ears and also provide ade-

quate seal for the ears to exclude ambient noise. The gimbal gasket 103B may comprise a silicon dust cover, for example, that provides a volume between the ear pad 103A and outer shell 103C, to allow the ear cup 103 to pivot about a gimbal within the ear cup 103.

[0028] The force on the ear may be adjusted due to the shape and rigidity of the headband 101 and associated parts, such as the headband slides 113. Extending the length of the arms of the headset by pulling the headband slides out of the ear cups 103 may increase the force on the user's ears, as this decreases the distance between the ear cups 103 when the headset is not placed on a head, so that more force is needed to expand the headset 100 over the user's head. In contrast, the force on the ear may be decreased by reducing the length of the arms of the headset by pushing the headband slides 113 into the ear cups 103.

[0029] The upper headband 119 may be coupled to the headband endcaps 117, and slider knobs 105 may be incorporated in the upper headband 119 for adjusting the rigidity of the headband 101. In an example scenario, in the region where the slider knobs 105 are integrated, the upper headband may comprise two strips of support structure 119A, e.g., plastic strips, between which the slider knobs 105 may be actuated. In an example scenario, the support structures 119A may be less rigid than the headband center block 101A and the headband endcaps 117, allowing for a flexibility that may be compensated for utilizing the slider knobs 105.

[0030] The two slider knobs 105 shown in the right side of the upper headband 119 merely indicate the full range that the slider knobs 105 may travel. The slider knobs 105 may be coupled to a metal or rigid plastic strip in the upper headband 119. By sliding the slider knobs 105 downward towards the headband endcaps 117, the rigid strip within the strips of support structure of the upper headband 119 may increase the rigidity of the upper headband 119, thereby increasing force of the ear cups 103 against the ears of the user.

[0031] As shown further in FIGS. 2-6, the slider knobs 105 may be coupled to metal bands that add rigidity to the headband 101 when extended down to near the headband endcaps 117. The headband 101 may also comprise a headband center block 101A, which may comprise a solid and rigid structure to which the upper headband 119 is coupled, similar to the headband endcaps 117. The headband center block may comprise a rigid plastic, for example. Therefore, force isolation in the headset 100 may be provided by the variable rigidity actuated by the slider knobs 105 in concert with the headband endcaps 117 and headband center block 101A rigid support structures.

[0032] FIG. 2 illustrates a front view of a headset with force isolation, in accordance with an example embodiment of the disclosure. Referring to FIG. 2, there is shown the headset 100 with elements as described with respect to FIG. 1, for example. The arrows above the headband 101 show the range of travel for the slider knobs 105.

[0033] Actuating the slider knobs 105 provides a variable rigidity in the headband 101, as a metal strip attached to each of the slider knobs 105 provides increased rigidity to the headband 101 when slid downward toward the headband endcaps 117 and less rigidity when at the top position adjacent the headband center block 101A. This is shown further with respect to FIGS. 3-7, for example.

[0034] FIG. 3 is a top view of a headset with force isolation, in accordance with an example embodiment of the disclosure. Referring to FIG. 3, there is shown a top view of the headset 100 with the headband 101, headband center block 101, ear cups 103, slider knobs 105, and headband endcaps 117. As shown by the arrows, the slider knobs 105 may be actuated from near the headband center block 101 down the headband 101 to the headband endcaps 117, thereby increasing the rigidity of the headband 101.

[0035] FIG. 4 illustrates an oblique view of a headband slide for force isolation, in accordance with an example embodiment of the disclosure. Referring to FIG. 4, there are shown a headset 101 and associated components including the headband center block 101A, headband endcaps 117, slider knobs 105, and upper headband 119. There is also shown a movable strip 105A coupled to the slider knob 105. The movable strip 105A may comprise a rigid material, such as a metal, for example. The upper headband 119 comprises support structure 119A, which may comprise strips of plastic.

[0036] The slider knobs 105 are shown in the in the low position in FIG. 4 where the movable strip 105A extends the length between the headband center block 101A and the headband endcaps 117, thereby increasing the rigidity of the headband 101. In instances where the slider knob 105 is at the top near the headband center block 101A, the support structure 119A provides the rigidity for the headband 101, which is less than when the movable strip 105A is extended.

[0037] FIG. 5 illustrates a partial exploded view of the headband with force isolation, in accordance with an example embodiment of the disclosure. Referring to FIG. 5, there is shown force isolation system 500 comprising the headband 101 and headband endcaps 117. The headband 101 comprises the headband center block 101A and upper headband sections 119, which may comprise support structures 119A. The support structures 119A may comprise semi-rigid material, e.g., plastic, that provides most or all of the rigidity of the headband 101 when the movable strip 105A is retracted.

[0038] The movable strip 105A is shown detached from the headband 101 and slider knob 105 for clarity, and illustrates its curved structure enabling it to slide up and down within the headband 101. The movable strip 105A comprises a more rigid structure than the upper headband structures 119, and support structures 119A, such that when it is extended fully it increases the rigidity of the headband 101.

[0039] Force isolation of the headset 100 may be pro-

vided by a configurable rigidness of the headband 101 between rigid endpoints. The rigid endpoints of the headband 101 may comprise the headband center block 101A and the headband endcaps 117 while the configurable rigidness may be provided by the movable strip 105A and the support structures 119A.

[0040] FIG. 6 illustrates a bottom view of the headband, in accordance with an example embodiment of the disclosure. Referring to FIG, 6, there is shown headband 101 comprising the headband center block 101A and upper headband 119 with support structures 119A. There is also shown the metal strips 105A that may be configured by the slider knobs 105 (not shown in this view) up and down in the upper headband 119 to configure the stiffness of the headband 101.

[0041] The metal strips 105A are shown in FIG. 6 in the bottom position, where they are fully extended between the support structures 119A to the headband endcaps 117, adding rigidity and force isolation to the headband 101.

[0042] FIG. 7 is a flowchart illustrating an example process for a headset with an internal gimbal. Referring to FIG. 7, there is shown a flow chart 700, comprising a plurality of example steps. In step 702, the headset 100 may be powered up for gaming, phone, or music playback purposes, where the headset is a powered headset, or may be plugged into a signal source if the headset is a passive headset. In step 704, the headset may be placed on a user's head and in step 606, the slider knobs may be adjusted for desired rigidity and force isolation of the headband.

[0043] In an example embodiment of the disclosure a headset with force isolation is disclosed where the headset may comprise a headband having two upper headband sections coupled by a center block and two ear cups, where each ear cup is coupled to one of the two upper headband sections. Each of the two upper headband sections comprise side support strips between which a movable strip may be operably placed utilizing movable strips may provide increased rigidness for the headband when they are fully extended between the side support strips utilizing the slider knob.

[0044] The rigidness of the headband may decrease when the movable strips are retracted from between the side support strips and into the headband center block utilizing the slider knob. The side support strips may comprise plastic and the movable strip may comprise metal. The center block may be more rigid than the side support strips. The center block may comprise plastic. The headband may comprise headband endcaps at lower ends of the headband. The slider knobs may be operably configured at positions between the center block and the headband endcaps. The ear cups may be coupled to the upper headband sections via headband slides that are coupled to the headband end caps.

[0045] In another example embodiment, a headset may comprise a headband with two upper headband sections coupled by a center block and two ear cups, where each ear cup is coupled to one of the two upper headband sections. Each of the two upper headband sections comprise flexible side support strips between which a movable rigid strip is operably placed utilizing a slider knob.

Claims

1. An audio headset (100) system, the system comprising:

   a headband (101) having two upper headband sections (119) coupled by a center block (101A); and
   two ear cups (103), each coupled to one of the two upper headband (119) sections, wherein each of the two upper headband (119) sections comprise side support strips (119A), whereas between which the side support strips (119A) a movable strip (105A) is located operably placed utilizing a slider knob (105).

2. The system of claim 1, wherein the movable strips (105A) provide increased rigidness for the headband (101) when fully extended between the side support strips (119A) utilizing the slider knob.

3. The system of claim 1, wherein the rigidness of the headband (101) decreases when the movable strips (105A) are retracted from between the side support strips (119A) and into the center block utilizing the slider knob.

4. The system of claim 1, wherein the side support strips (119A) comprise plastic and the movable strip (105A) comprises metal.

5. The system of claim 1, wherein the center block (101A) comprises plastic and is more rigid than the side support strips (119A).

6. The system of claim 1, wherein the headband (101) comprises headband endcaps (117) at lower ends of the headband (101).

7. The system of claim 6, wherein the slider knobs (105) are operably configured at positions between the center block (101A) and the headband endcaps (117).

8. The system of claims 6 or 7, wherein the ear cups (103) are coupled to the upper headband (119) sections via headband slides (113) that are coupled to the headband end caps (117).

9. An audio headset, the headset comprising:

   a headband (101) having two upper headband

sections (119) coupled by a center block (101A); and

two ear cups (103), each coupled to one of the two upper headband sections (119), wherein each of the two upper headband sections (119) comprise flexible side support strips (119A) between which a movable rigid strip (105A) is operably placed utilizing a slider knob (105).

10. The headset of claim 9, wherein the movable strips (105A) provide increased rigidness for the headband (101) when fully extended between the side support strips (119A) utilizing the slider knob (105).

11. The headset of claim 9, wherein the rigidness of the headband (101) decreases when the movable strips (105A) are retracted from between the side support strips (119A) and into the center block (101A) utilizing the slider knob (105).

12. The headset of claim 9, wherein the side support strips (119A) comprise plastic and the movable strip (105A) comprises metal.

13. The headset of claim 12, wherein the center block (101A) comprises plastic and is more rigid than the side support strips (119A).

14. The headset of claim 9, wherein the headband (101) comprises headband endcaps (117) at lower ends of the headband (101).

15. The headset of claim 9, wherein the ear cups (103) are coupled to the upper headband sections (119) via headband slides (113) that are coupled to the headband end caps (117) and the slider knobs (105) are operably configured at positions between the center block (101A) and the headband endcaps (117).

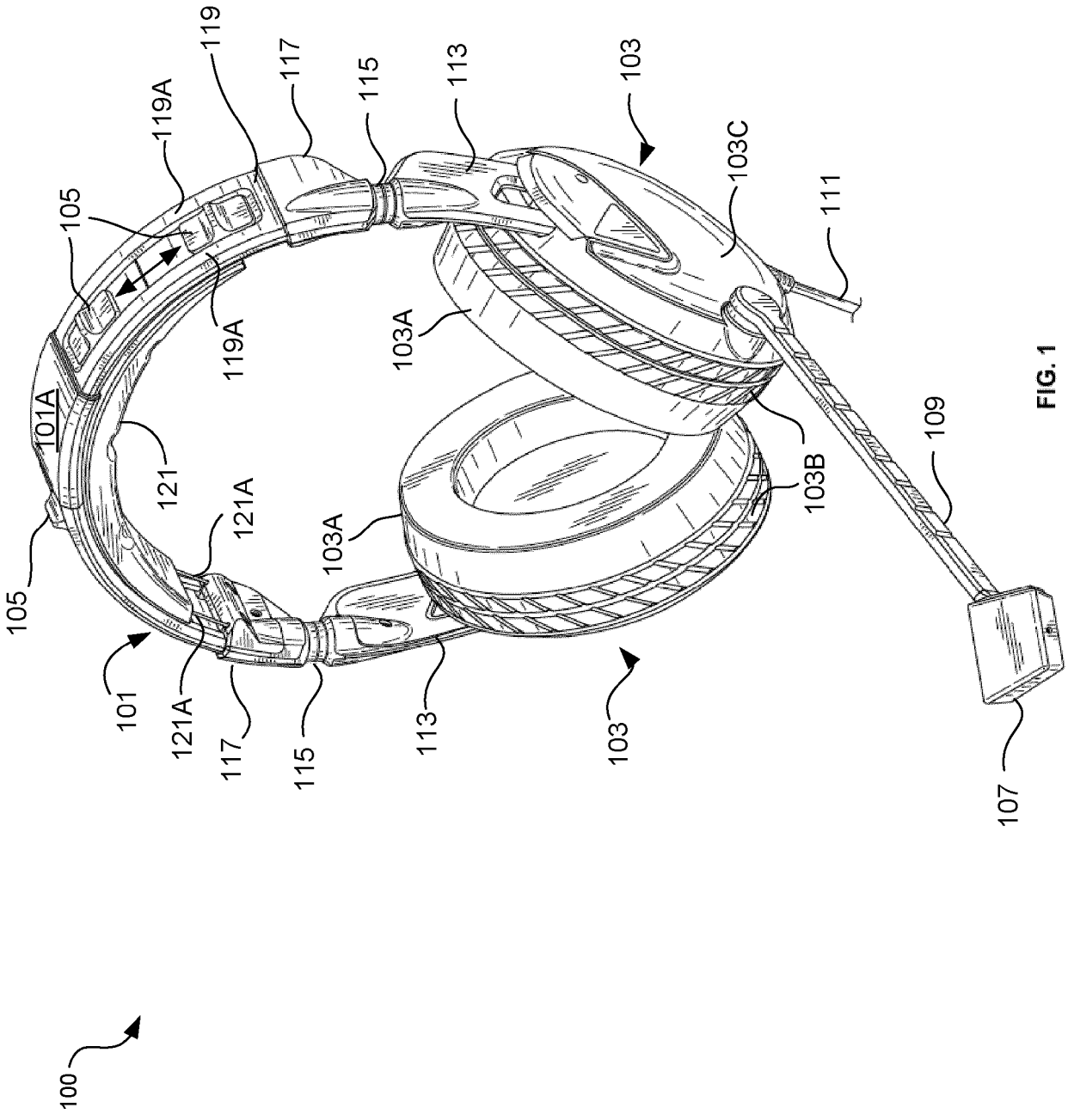
100
101
101A
103
103A
103B
103C
105
107
109
111
113
115
117
119
119A
121
121A

FIG. 1

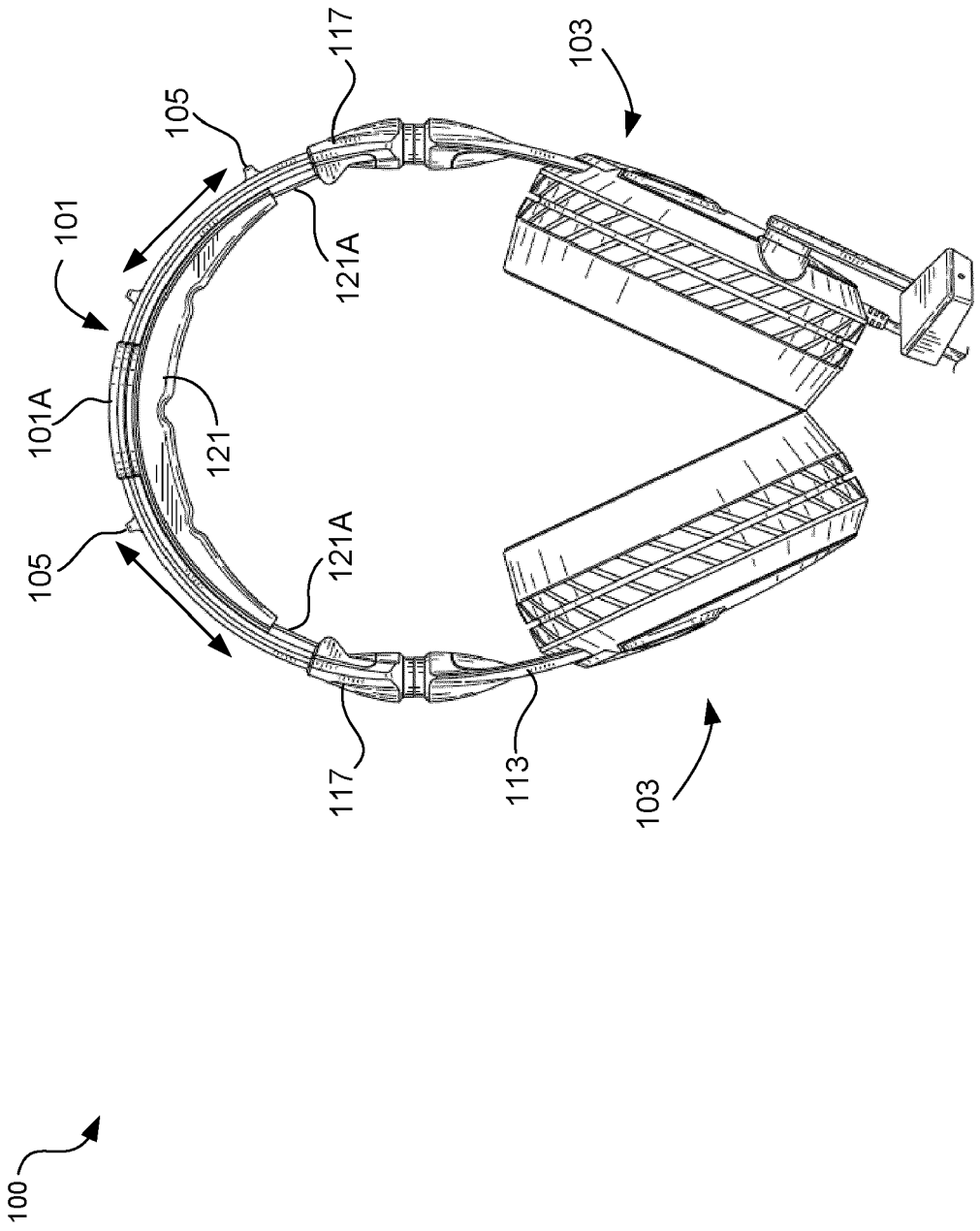

FIG. 2

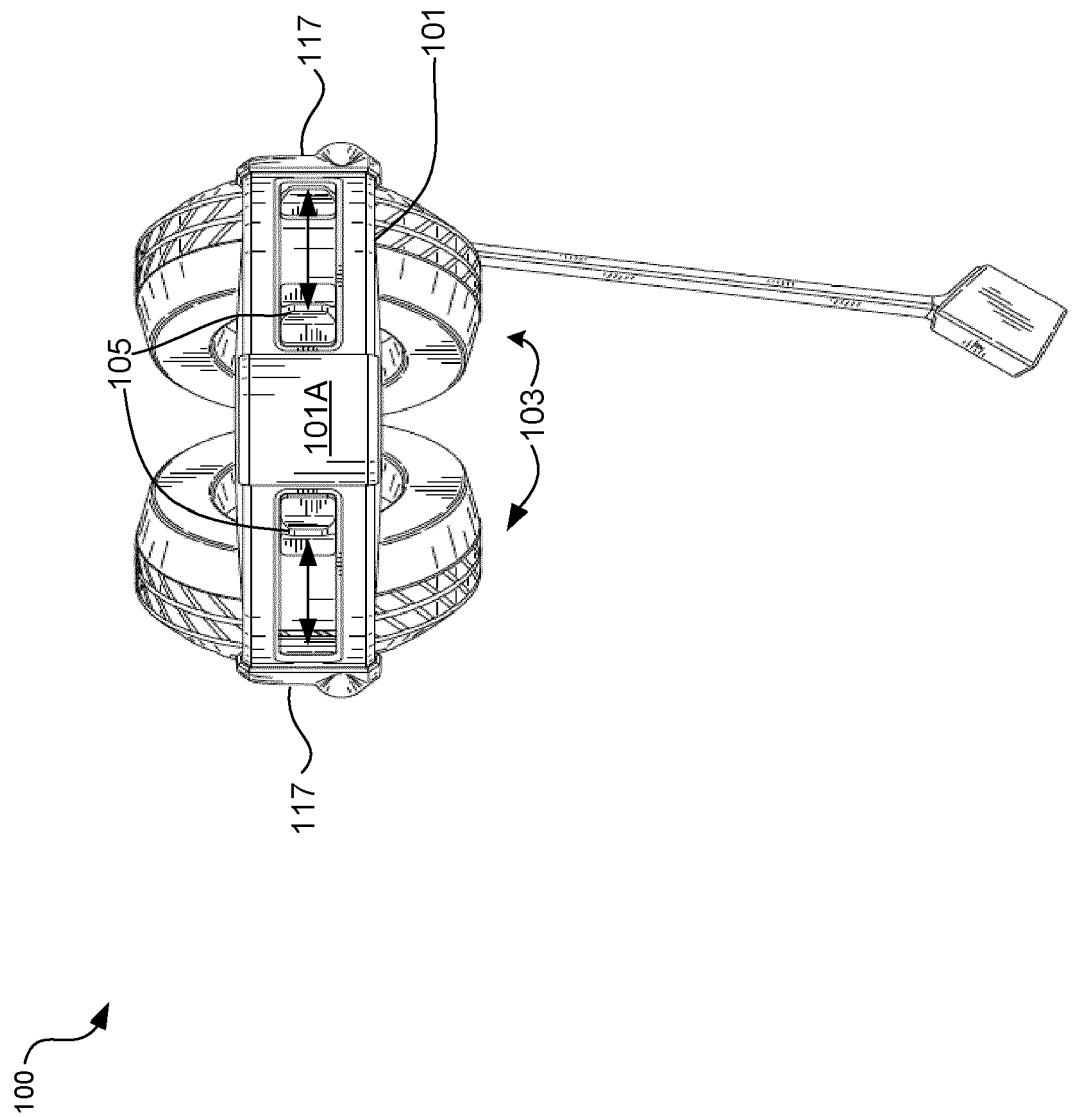

FIG. 3

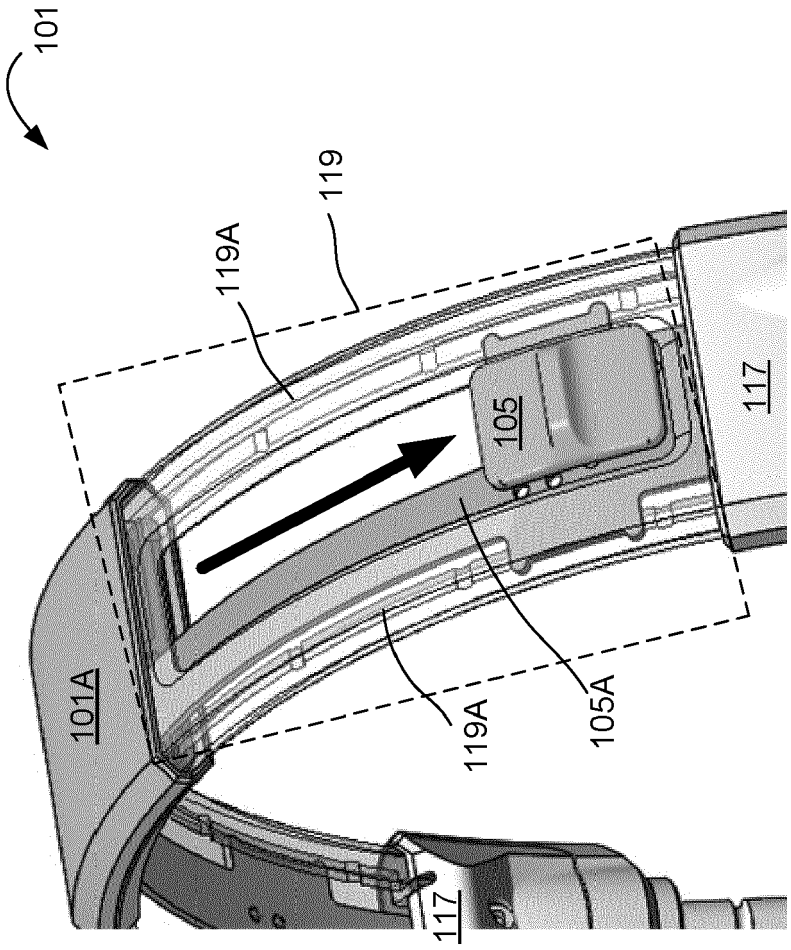

FIG. 4

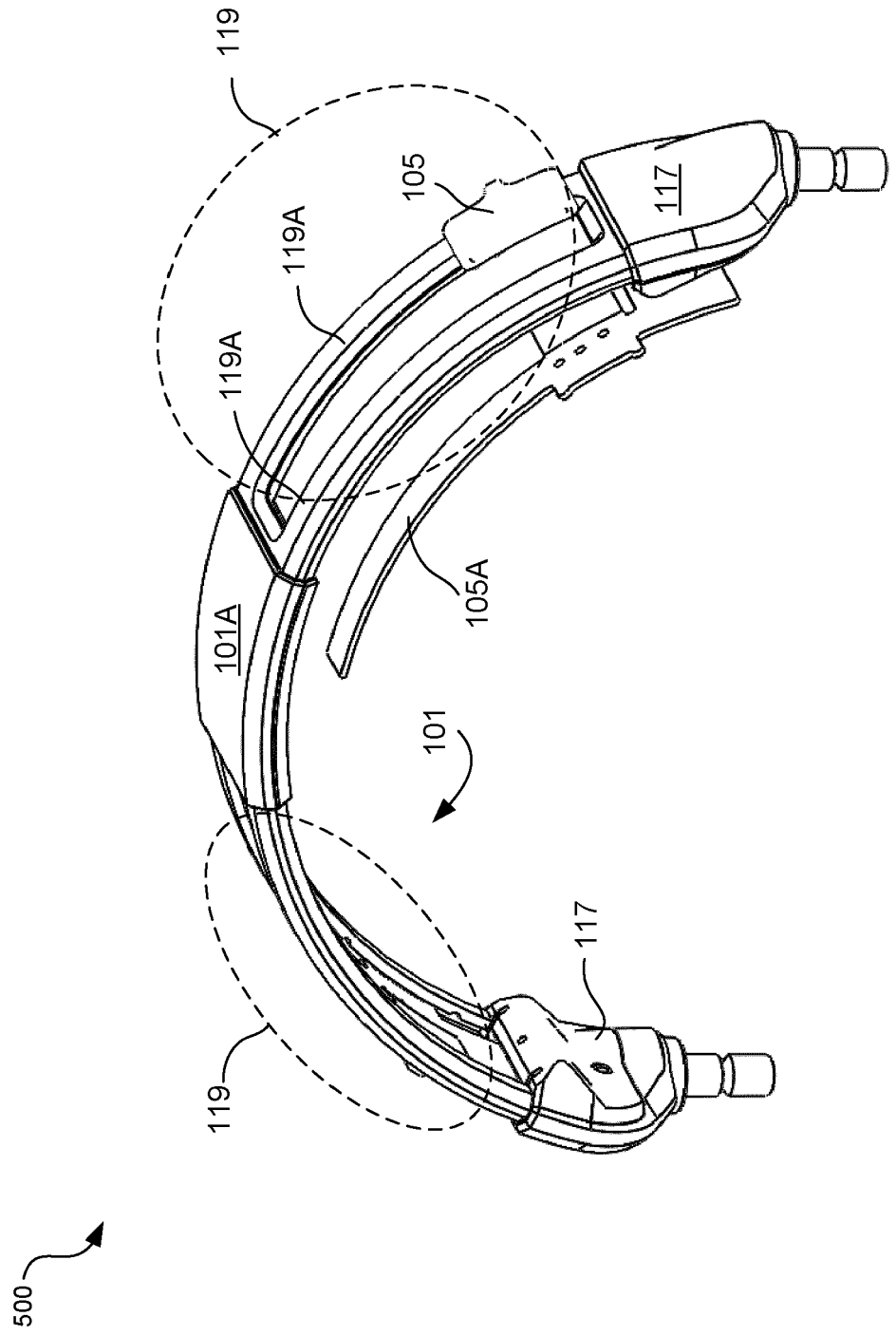

FIG. 5

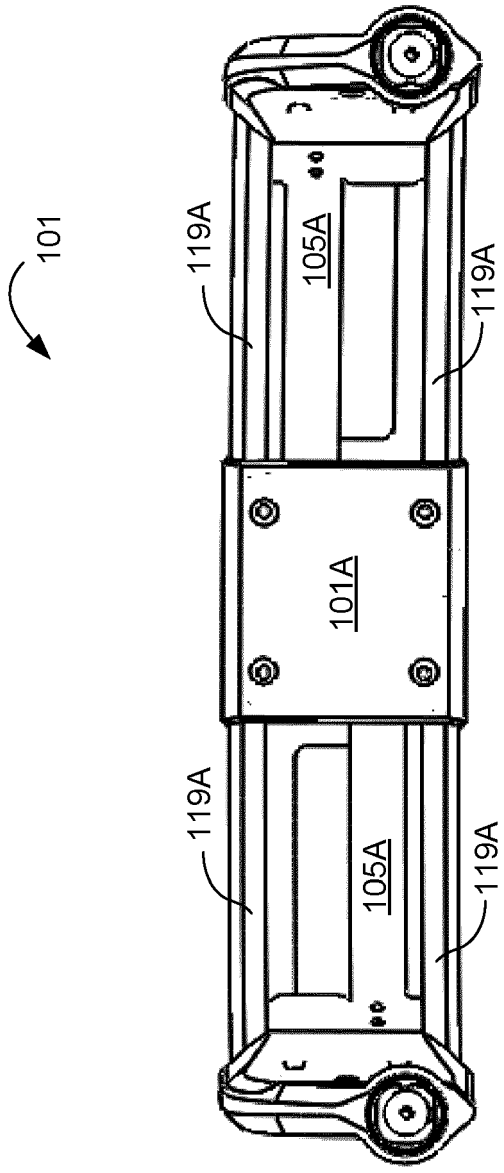

FIG. 6

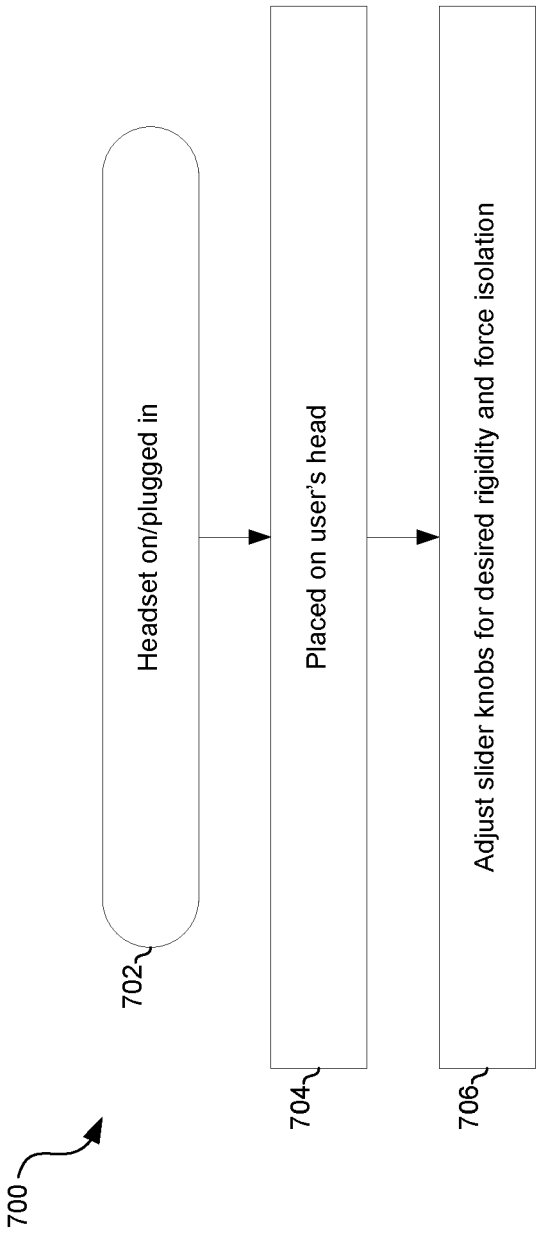
700
Headset on/plugged in
702
Placed on user's head
704
Adjust slider knobs for desired rigidity and force isolation
706

FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 20 18 9255

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 89/10107 A1 (MILMAS AB [SE]) 2 November 1989 (1989-11-02)	1-3, 5-11, 13-15	INV. H04R5/033
Y	* abstract * * page 5, line 33 - page 6, line 2 * * page 6, line 11 - line 34 * * figures 1-5 *	4,12	

Y	US 2008/037816 A1 (LEE SEUNG-JAE [KR] ET AL) 14 February 2008 (2008-02-14) * abstract * * paragraph [0029] * * figures 3-7 * * claim 5 *	4,12	

A	US 2014/263493 A1 (AMURGIS CHARLES WILLIAM [US] ET AL) 18 September 2014 (2014-09-18) * abstract * * figures 1-5 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

H04R
A61F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 September 2020	Fülöp, István

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 20 18 9255

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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17-09-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 8910107 A1	02-11-1989	AU 3541389 A	24-11-1989
		DE 68927829 T2	28-08-1997
		EP 0422012 A1	17-04-1991
		SE 463803 B	28-01-1991
		US 5068923 A	03-12-1991
		WO 8910107 A1	02-11-1989
US 2008037816 A1	14-02-2008	KR 100762626 B1	01-10-2007
		US 2008037816 A1	14-02-2008
US 2014263493 A1	18-09-2014	GB 2513968 A	12-11-2014
		US 2014263493 A1	18-09-2014

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 8910107 A1 **[0003]**
- US 20080037817 A1 **[0004]**
- US 20140263493 A1 **[0005]**
- US 2014023222 A1 **[0006]**